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INSTITUTE OF GAS TECHNOLOGY

THE GAS INDUSTRY'S OWN EDUCATIONAL AND RESEARCH FACILITY

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GAS ABSTRACTS

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1. GAS INDUSTRY

AGA Lab Research

McPherson, H. L. TWENTY-ONE RESEARCH PROJECTS ASSIGNED TO AGA LAB IN 1952. *Gas*, 24, 36-37 (1953) January.

A review of the AGA Laboratory projects for 1952 is given. Five projects were completed, with the results being published in two bulletins and three research reports. Sixteen other projects are on an active status.

E. F. Searight

Belgian Gas Industry

Leburton, M. G. THE STATE OF THE GAS INDUSTRY IN BELGIUM IN 1951. (LA SITUATION DE L'INDUSTRIE DU GAZ EN BELGIQUE EN 1951. *Rev. gen. Gaz* (Belgium), 74, 247-262 (1952) November/December.

A very prosperous year is reported for the Belgian gas industry. The 112.5 billion CF of gas distributed represents an increase of 18.3% over 1950. The total includes 90.4 billion CF. of coke oven, producer, water gas and oil gas made at coke-oven plants, and additional blast-furnace gas, coal-mine methane and "benzol" gas, which is purchased. The coke oven gas is made in 9 metallurgical plants (820 ovens in 20 batteries) and 11 non-metallurgical (623 ovens in 20 batteries), which carbonize 7,933,-379 tons coal, 6,459,840 of which is Belgian. The data from the two types of plants are presented in tables and graphs, and discussed in considerable detail. O. P. Brysch

Education

Roberts, A. L. TEACHING AND RESEARCH AT LEEDS—A SURVEY OF THE PRESENT POSITION. *Gas J.* (British), 272, 564-566 (1952) December 3.

The Department of Coal Gas and Fuel Engineering has grown steadily since shortly after the chartering of Leeds University in 1904. The endowment of the Livesey Professorship in 1909 and the formation of the Joint Research Committee of the Institution of Gas Engineers and the University have featured the constant strong support of the gas industry groups. Four degree courses are taught—Gas Engineering and Fuel, Metallurgy, Ceramics, and Chemical Engineering—with a combination 3-yr. B.Sc. degree, and separate 4-year honors degrees. Post-graduate training of 1, 2, or 3 years for science, engineering or industrial candidates is offered, leading to the M.Sc. degree. In 1952, a staff of 16 had supervision of 88 undergraduates and 32 post-graduates. The Livesey Professors—W. A. Bone, J. W. Cobb, D. T. A. Townend and the author have contributed outstanding leadership in teaching and research. A new building, long planned, may be built soon to provide a 50% increase in accommodations. O. P. Brysch

Gas Industry 1952

Smith, F. C. GAS ATTAINS NEW HEIGHTS IN 1952. *Am. Gas Assoc. Monthly*, 35, 2-8, 44, 45 (1953) January.

Despite keen competition for steel, manpower and investment dollars, nearly $1.2 million were spent in 1952 in the gas industry's expansion program, most of it in construction of natural gas pipelines and facilities. Statistics on 1952 utility gas sales and their increase over 1951 figures are: customers, 27,019,000, 6%; gas sales, 52,557,000,000 therms, 9%; revenues, $2,455,022,000, 10.2%. Because of changeovers to natural gas in major sales areas, manufactured and mixed gas sales showed a decline from 1951.

A. E. Neumann

Gas Research

Pettyjohn, E. S. GAS INSTITUTE IS SEEKING NATURAL GAS SUBSTITUTES. *Gas*, 24, 34, 35 (1953) January; *Gas Age*, 111, 38, 39, 72-5 (1952) January 15; *Canad. Gas J.*, 46, 7-9 (1953) January.

The director of the Institute of Gas Technology, Chicago, reviews IGT's progress in the production of natural gas substitutes from coal, oil, and LPG, to meet today's peak loads as well as the future day when immediate supplies of natural gas are not adequate for distribution companies' needs. Sixty percent of the Institute's research activities are now concentrated in this one broad field. The article closes with brief mention of other important natural gas research projects under way at IGT.

A. E. Neumann

Industry Cooperation

Hillyer, H. WHY ALL FOUR MAJOR SEGMENTS MUST UNITE IN A SINGLE GAS INDUSTRY PROGRAM. *Gas Age*, **111**, 40, 41, 75-76 (1953) January 15.

Natural gas producers, pipe line companies, utilities and gas appliance manufacturers have a common interest, and should be coordinated for a prosperous future. Here is a stimulating and practical suggestion on how such a program may be implemented. Author's Abstract

Pacific Northwest

Bemis, J. M. NATURAL GAS FOR THE PACIFIC NORTHWEST? *Public Utilities Fortn.*, **50**, 909-912 (1952) December 18.

An excellent summary of the confused situation, involving United States and Canadian federal, state, and provincial commissions, and competition between pipeline companies on both sides of the border. This is holding the Pacific Northwest as the only major section of the United States that is without the benefits of natural gas. A. E. Neumann

Peak-Day Shortage

GAS STRAIN PREDICTED. *Oil Gas J.*, **51**, 34 (1952) December 29.

The potential peak day demand for natural gas in the winter of 1955-56 is expected to exceed last winter requirements of 25.3 billion CF by 50%. The industry is expected to fall somewhat but not greatly short; most of the deficiency will be in PAD districts IB & 11A.
J. D. Parent

Rate Schedules

Fleischmann, E. AUTOMATIC ADJUSTMENT CLAUSES IN GAS RATE SCHEDULES. *Public Utilities Fortn.*, 50, 897-902 (1952) December 18.

Cost-of-gas escalators in natural gas schedules should be spread to the classes of service depending on the size of the demand and commodity portions of the change in price. Modification of this principle may be dictated if bargaining with unregulated producers is possible.
J. D. Parent

Schreiber, R. DIE PREISKLAUSEL IN GAS-LIEFERUNGSVERTRAEGEN (PRICE CLAUSES IN GAS DELIVERY CONTRACTS.) *Gas- und Wasserfach* (German), 93, 672-676 (1952) December 1.

Experience in Germany with price clauses in gas delivery contracts is discussed. The various factors which determine or affect these clauses, and their use in calculations is reviewed. The study is restricted entirely to carbonization, but similar contracts are used in Seattle where the oil price determines the gas price. H. R. Linden

Safety Regulations

Feinburg, B. F. WHY THE NEW YORK PUBLIC SERVICE COMMISSION HAS ISSUED NEW SAFETY ORDERS. *Gas Age*, **110**, 25-26 (1952) December 18.

The natural gas industry has grown greatly in the State of New York and facilities have been expanded considerably. FPC has control over pipe line certificates for construction in general, but has no set code of safety. The N. Y. Public Service Commission is imposing its own safety standards at a cost of $6,000,000 to distribution companies and an unknown amount to transmission companies. J. D. Parent

RULES, PRECAUTIONS AND IMPROVEMENTS APPLICABLE TO GAS CORPORATIONS ENGAGED IN DISTRIBUTION OF GAS. *Gas Age*, **110**, 29, 65, 66 (1952) December 18.

Regulations for gas distribution companies are listed. J. D. Parent

RULES, PRECAUTIONS AND IMPROVEMENTS APPLICABLE TO GAS CORPORATION ENGAGED IN TRANSMISSION OF GAS. *Gas Age*, **110**, 26-28, 70 (1952) December 18.

Transmission companies are to satisfy the 1952 ASA code for pressure piping with certain added restrictions. The API-AGA code on welding of gas pipe lines is also to be followed. Casing for crossings, valving, cover, corrosion control and other topics are discussed.
J. D. Parent

2. APPLIANCES

Burners

Abrams, V. R. (assigned to Geo. D. Roper Corp.) GAS BURNER WITH VERTICALLY SPACED OUTLET SLOTS. U.S. 2,621,722 (1952) December 16.

A slot-type gas burner is described, in which the slots are formed by vertically superimposed spaced disks, each with an aligned, central hole, to permit passage of gas from the mixing tube.
E. F. Searight

Hart, L. E. and Brown, R. C. GAS BURNER AND SECONDARY AIR FEED MEANS. U.S. 2,625,215 (1953) January 13.

A gas burner with secondary air supplied transversely at the base of each gas jet is described.
E. F. Searight

Manteria, J. GAS BURNER HAVING RADIANT FORAMINOUS COMBUSTION CHAMBER WALLS. U.S. 2,621,721 (1952) December 16.

A hot-air furnace or kitchen range burner having radiant foraminous combustion chamber walls is described. E. F. Searight

Burner Design

Wilson, C. W. LIFTING AND BLOWOFF OF FLAMES FROM SHORT CYLINDRICAL BURNER PORTS. *Ind. Eng. Chem.*, 44, 2937-2942 (1952) December.

An equation for the critical boundary velocity gradient for short cylindrical ports is given. An expression is developed for the frictional pressure drop through the port. The results for a range-top burner are compared to those for tubular burners, and a satisfactory correlation is obtained. E. F. Searight

Consumption Profiles

Bryant, A. A PRELIMINARY DESIGN LOAD STUDY FOR A DISTRIBUTION SYSTEM. *Gas*, 28, 40-48 (1952) December.

This article presents concrete operating data orientated toward the establishing of "customer profiles" of gas consumption for a given distribution area. It suggests the development of a four variable analysis to determine design peak loads. The variables are, (1) customer usage, (2) load per acre, (3) physical characteristics of houses in the test area, and (4) relative effect of temperature, wind and sky radiation on load. Tables and graphs are included. R. A. Brown

Refrigerator

HOUSEHOLD ICEMAKING IS CONTINUOUS PROCESS IN BASICALLY NEW GAS REFRIGERATOR. *Am. Gas J.*, 177, 43, 46 (1952) December.

Automatic large-capacity ice production is provided in a new gas refrigerator. From 11 to 13-1/2 lb of ice are frozen in molds, 7 pieces at a time, and automatically transferred to a storage basket. Sticking together is avoided by holding the temperatures at 5° F.
E. F. Searight

3. COMBUSTION AND INDUSTRIAL FURNACES

Burner

Dufault, H. D. (assigned to Heatbath Appliances, Inc.) AIR-COOLED GAS BURNER. U.S. 2,621,720 (1952) December 16.

An air-cooled gas burner for luminous operation is described. The cooling is provided to prevent gas break down. E. F. Searight

Coal-Fired Turbines

Bucher, J. B. THE USE OF LOW GRADE FUELS IN GAS TURBINES. *Gas & Oil Power*, 47, Ann. Techn. Rev. No., 284-286 (1952).

Successful tests made on a gas turbine using peat of 50% moisture content indicate that the use of wet low-grade fuel is practical. The peat was dried to 25% moisture on passing through the mill and hoppers, and is combustible at this wetness with a sufficiently high air preheat. The ash content of the peat was only 2-3%. A closed-cycle gas turbine with a coal drying plant also is described, in which exhaust gases from the combustion-air preheater are fed to the mill where they dry the fuel (pond slurries of 20% ash and 25% moisture content). E. J. Pyrcioch

District Heating

Beecroft, T. A. DISTRICT HEATING. *Gas World* (British), **136**, 1624-1626 (1952) December 27.

The methods suggested are (1) thermoelectric, (2) hot-water or steam central plants, (3) waste-heat, and (4) heat-pump. The hot water or steam generation plant is the most favored method. Several English installations are described specifically. E. F. Searight

Heat Treating

Bremmer, F. H. and Zehnder, F. J. GAS-FIRED FURNACES HELP SAVE CRITICAL METALS IN MAKING HIGH STRENGTH OIL WELL CASING. *Ind. Gas*, 3-5 (1952) December.

For the last 5 years this plant has produced A.P.I. casing in Grade N-80 for deep oil wells from plain carbon steel; 80,000 tons production has saved 300,000 lbs. of molybdenum and 1,500,000 lbs. of manganese.

Authors' Abstract

Hess, F. O. (assigned to Selas Corp. of America) METHOD OF HEATING. U.S. 2,625,-387 (1953) January 13.

This patent describes a method of heating metal objects in a furnace, wherein all portions of the heating path are at the same temperature. E. F. Searight

Wilson, A. R. FLAME HARDENING AND TEMPERING OF WIRE. *Ind. Gas* (British) **26**, 76-78, 88, 94, 95 (1952) December.

Bright plain carbon-steel wire must be carefully hardened and tempered for use in carding of woolen textiles. This is usually done by open flame heating, using long pin-hole gas burners. Improved heating control by thermocouples, and development of refractory burner radiants has led to improved thermal efficiency, with reduced gas consumption. However, problems of gas interchangeability with such radiants require further study.

E. F. Searight

Industrial Gas

Hess, F. O. GAS PLAYS MANY ROLES IN A TECHNICAL ECONOMY. *Gas*, **29**, 41-44 (1953) January.

Using gas as an example, this paper describes the important trend that is developing in regard to the importance and position of fuel consumption in this country. More than just a fuel, gas has become a precision tool for industry, a substitute for critically short materials, a substitute for labor and an origin and creator of new products. R. A. Brown

Infrared Drying

Reiter, F. M. ADVANTAGES OF INFRARED DRYING WITH GAS. *Ind. Gas*, 8-10, 24-26 (1952) December.

A comparison of electric and gas infrared drying is given for the specific case of aluminum in cube trays. E. F. Searight

Lithographing Oven

LITHOGRAPHIC PRINTING AND DRYING OVEN. *Ind. Gas* (British), **26**, 68-74 (1952) December.

A gas-fired installation, one of the largest in England, for lithographic printing and drying is described. Flat metal sheets (72 x 45 inches) are coated in one or more colors and mechanically conveyed through a 170 x 11 x 8 ft. baking oven. This is heated by six gas-fired combustion chambers equipped with circulating fans and thermostat controls, which permit adjustment of temperatures from 250° to 450° F. with gas consumptions of 15.2 M to 30.5MCF/hour. Completely mechanized conveying, printing, drum-forming, testing, cleaning and spraying operations then follow in order. E. F. Searight

"Packaged" Steam Plants

Payne, E. C. FUEL AND EQUIPMENT CONSULTING SERVICE FOR THE SMALL STEAM PLANT. *Coal Heat*, **6**, 8-10, 26-28 (1952) December.

Small steam plants (one operating man per shift) burn about 75 million tons of coal per year, and modernization of such plants requires engineering service if this coal market is to be held. Bituminous Coal Research, Inc., with other coal associations, and regional committees are preparing "Packaged Plans and Specifications", prescribing properly engineered combinations of boilers, stokers, controls and handling equipment for such plants. Three data-sheets listing coal characteristics and plant data are presented and their use in plant design and fuel selection is explained.

O. P. Brysch

Pilots

Sperryn and Co., Ltd. PILOTS FOR MULTI-JET BURNERS. *Coke & Gas* (British) 14, 443-444 (1952) December.

Two methods of piloting multi-jet burners are described; one using multiple pilot, and the other using a ladder pilot. E. F. Searight

4. CARBONIZATION AND GASIFICATION

Belgian Coke Plants

TWO BELGIAN COKING PLANTS. *Coke & Gas* (British) 14, 417-424 (1952) December; 5-10 (1953) January.

The reconstructed John Cockerill Ltd. plant at Seriang is described in the first section. One new battery (1952) of 56 Coppee compound ovens, and an older (1936) battery of 44 Coppee are in regular service, carbonizing 1930 tons coal/day. An older (1924) battery of 64 Solvay-Piette ovens is to be repaired for standby capacity of 800 tons/day. The Coppee chambers are 44 ft. by 13 ft. by 18 inches (741 cu.ft.) of silica brick, underfired by blast-furnace or coke-oven gas (under-jet) with self-sealing doors. New coal storage, handling, pulverizing and charging equipment is described and illustrated. The second section similarly describes a plant of 44 new Coppee ovens, replacing the 1918-1926 ovens now idle. This was built at Flémalle for the Metallurgique d' Esperance-Longdoz, Ltd.

O. P. Brysch

Carbonizing Processes

Horner, H. R. and Woodward, W. K. (assigned to Reilly Tar & Chemical Corp.) U.S. 2,622,-061 (1952) December 16.

A special sealing device is claimed in the heating system for a fluidized charge of coal or pitch. Metal heating-tubes, centrally fired from above, and vented annularly, are sealed by a sliding fit through packing rings in the roof of the oven, and carry bottom conical plugs which fit holes in a channel formed in the oven floor. After preliminary coking of the charge, the heating tubes are slid upward, leaving vertical passages in the charge, which may be used as calcining flues, by burning therein a heating gas introduced through the now-open floor-holes. O. P. Brysch

Lesher, C. E., Heights, B. A. (assigned to Pittsburgh Consolidation Coal Company) LOW TEMPERATURE CARBONIZATION OF COAL. U.S. 2,622,059 (1952) December 16.

Fresh coal mixed with preheated coked residue (at 1000-1400° F.) is fed continuously to a rotary cylindrical retort, where it mixes with an existing hot granular bed and is distilled solely by the heat of the coked residue. Volatiles and coked residue are withdrawn and part of the residue is preheated by fluidization with an oxidizing gas before being recycled.

O. P .Brysch

Myhill, A. R. SOME COMPARISONS OF THREE CARBONIZING SYSTEMS. *Gas Times* (British) 73, 424, 426, 429 (1952) December 26.

Factors relating to heat losses and carbonizing results are discussed for three types of carbonizing equipment,—horizontal retorts, intermittent vertical chambers and continuous vertical retorts. A tabulated comparison of these is given, showing the percent of total thermal input recovered as useful heat in products and lost in the process. By steaming, the three systems yield respectively 81.7, 87.2 and 86.8% total useful heat, and 24.0, 26.6 and 26.0% useful heat in gas. Corresponding unsteamed horizontal yields are 78.4 and 24.0. The hydrocarbon enrichment value (H.E.V.), or yield of cracked stabilized hydrocarbon gases and vapors in the gas, varies for the same coal in the 3 processes, approximating 38, 37 and 34 to 35 respectively as favorable cracking conditions decrease. Cracking conditions, coke yields and heat losses are briefly reviewed. (See *Gas Abs.* 7, 274 (1951) Dec.) O. P. Brysch

Schutte, A. H. (assigned to The Lummus Co.) CONTINUOUS CARBONIZATION OF COAL AND OIL MIXTURES. U.S. 2,624,696 (1953) January 6.

The invention relates to a process and apparatus for low temperature (1000° F.-1400° F.) carbonization of coal and oil mixtures in the presence of a circulating column of heated coke particles. E. J. Pyrcioch

Coal Gasification

Dent, F. J. GASIFICATION PROGRAMME OF THE BIRMINGHAM RESEARCH STA-

TION. *Gas Times* (British), 123, 276, 281-284 (1952) November 8; *Gas World* (British), 136, 1370, 1371 (1952) November 29.

The work at the Birmingham Research Station in England, and at Lurgi and Ruhrgas in Germany is reviewed. An evaluation of cyclic, pressurized fixed-bed, pressurized fluid-bed, and suspended bed gasification of coal and coke is presented. In view of the rapid decrease in reserve of coking coal, the use of cheaper high-ash and poorly-coking coals will offset the higher operating costs of these newer processes, and will justify their use in gas making.

S. Mori

CO Generation

Dresser, T., and Smith, R. B. (assigned to Sinclair Refining Co.) GAS GENERATION. U.S. 2,625,465 (1953) January 13.

The patent refers to the method of generating carbon monoxide by an oxygen-fired coke bed with recycling of the product stream for quality control. C. von Fredersdorff

Coke Properties

Hulme, C. COKE FOR BLAST FURNACES. *Gas World*, (British) 137, (Coking Section) 7-9 (1953) January 3.

The properties of coke and its functions in the blast furnace are discussed. Physical factors such as size, uniformity of size and strength, have been shown by test and by long practice to be of most importance for good furnace conditions. Improved handling techniques, to eliminate some of the usual 15 falls, slides and shakes between the oven and blast furnace, deserve some consideration. O. P. Brysch

Inert Gas

Williamson, H. V. (assigned to Cardox Corporation) METHOD FOR PRODUCING INERT GASES. U.S. 2,624,711 (1953) January 6.

Inert gases are generated by combustion of air in a packed coke bed, with recycling provided for quality control. C. von Fredersdorff

Gas Reforming

Acone, G. METANO:H_2 + CO. *Rivista Combustibili*, 6, 697-707 (1952) November.

Conversion of methane to hydrogen and carbon monoxide is discussed, and results are reported of some experiments carried out both on pilot plant and on commercial scale. Different types of processes suitable for methane conversion are reviewed, namely the steam, carbon dioxide, and oxygen processes. The effects of the presence in the charge stock of higher hydrocarbons, sulfur compounds, and contaminant gases are also examined in detail. Author's Abstract

Mayland, B. J. (assigned to Phillips Petroleum Co.) METHOD OF REFORMING NATURAL GAS TO PRODUCE HYDROGEN AND CARBON MONOXIDE SYNTHESIS GAS. U.S. 2,622,089 (1952) December 16.

An improved method of operation of a gas reforming unit for natural gas in the presence of steam and carbon dioxide is claimed with use of high space velocities to give higher yields of reformed gas using substantially the same quantity of carbon dioxide per mol. of natural gas. Consequently less carbon dioxide is required in the feed per mol. of natural gas for a given hydrogen to carbon monoxide ratio in the effluent gas. H. A. Dirksen

Roberts, G., Jr. (assigned to Stanolin Oil & Gas Co.) METHOD FOR PRODUCING REDUCING GAS MIXTURES. U.S. 2,625,470 (1953) January 13.

A method is presented for making reducing gas mixtures from ethane, steam and carbon dioxide wherein higher pressures can be used. A greater flexibility and an economy of materials is effected by the use of multi-stage operation in reforming installations.

H. A. Dirksen

HCN Removal

Marsh, J. D., Newling, W. B. and Rich, J. THE CATALYTIC HYDROLYSIS OF HYDROGEN CYANIDE TO AMMONIA. *J. Appl. Chem.* (British), 2, 681-684 (1952) December 2.

Catalytic hydrolysis of hydrogen cyanide in the gas phase to ammonia is shown to be a practicable method for the removal of this undesirable constituent from hydrogen sulphide concentrates produced from coal gas. Results obtained using various catalysts at 400° are given, and the kinetics of the reaction on alumina in the range 200-300° are described.

Authors' Abstract

Water Gas Yields

Percival, G. PERFORMANCE OF A BLUE WATER GAS PLANT. *Gas World* (British), 86, 1567-1571 (1952) December 20.

This paper presents results from investigations carried on in a 300,000 cu.ft./day blue water gas plant to determine the influence of preheating air and steam. Increases of 10% in thermal efficiency and 20% in output were obtained with preheat. The greatest increase in gas yield and output was obtained at an intermediate degree of preheat (400° C.) when the gases leaving the generator were at a lower temperature than when a high degree of preheat was used. E. J. Pyrcioch

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Leburton, M. G. GAS INDUSTRY IN BELGIUM 1951. p. 41

Sailors, H. R. REMOVAL OF HYDROGEN SULFIDE. p. 48

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Acidizing

Justice, W. H. and Nielsen, J. P. IMPROVED TECHNIQUES DEVELOPED FOR ACIDIZING GAS PRODUCING AND INJECTION WELLS. *Petroleum Techn.*, 4, 285-288 (1952) December.

This paper describes an improved acidizing technique which has been applied in acidizing gas wells in the La Gloria Field. Wells acidized in this manner exhibited a much greater increase in deliverability than wells acidized in the conventional manner. The acid is injected into the well in small slugs separated by a small volume of high pressure gas. The acid and gas are displaced from the tubing by high pressure gas to reduce the hydrostatic head on the well when the acid is recovered from the well. The well is opened for production as soon as the acid and gas are displaced. This procedure permits a very rapid recovery of the acid which results in large increases in the deliverability of the gas wells. It has been found advantageous in the acidization of gas injection wells to inject the high pressure gas directly after the acid without backflowing the acid out of the well. This practice has made it possible to inject the gas in the injection wells of this field with a much lower pressure differential. This reduces the horsepower required to inject the gas and also decreases the number of injection wells required per reservoir.

Authors' Abstract

Change-Over

Grozier, D. F. THE BROOKLYN UNION NATURAL GAS CONVERSION: BIGGEST CHANGEOVER IN THE WORLD. *Gas Age*, 111, 29-73 (1953) January 1.

The character of the many problems attendant to Brooklyn Union's conversion to natural gas is discussed, starting with the nature of the supply and demand picture, through the decisions and the difficulties of the conversion itself. This article goes into considerable detail on very many points of interest, from conversion schools to customer reaction.

R. E. Bukacek

Communications

Lester, C. B. MICROWAVES FOR PIPELINERS. PART II: PROPAGATION. *Pipe Line News*, 24, 33-40, 57 (1952) December.

This paper considers the propagation of microwaves in the "standard atmosphere" and in addition discusses the effects and probable causes of the effects which occur in the "nonstandard atmosphere." R. A. Brown

Dehydration

Glasgow, C. O. PROPER SELECTION AND SIZING OF SOLID-DESICCANT-TYPE DEHYDRATORS. *Oil Gas J.*, 51, 73-74 (1953) January 5.

Selection and sizing of solid-desiccant-type dehydrators is discussed briefly. D. C. Gami

Drilling 1952

McCaslin, J. C. EXPLORATORY DRILLING HITS RECORD LEVELS. *Oil Gas J.*, 51, 196-197 (1953) January 26; *World Oil*, 136, 98 (1953) February.

In 1952 there were 10,571 wildcat completions with a total drilling of 47 million ft. Tables

of completions and footage by states are presented. B. E. Eakin

Gasoline Recovery

Sommariva, E. and Tesei, R. STUDIO SULLA COMPOSIZIONE DELLA GASOLINA DI RIPALTA. (STUDIES ON THE COMPOSITION OF RIPALTA GASOLINE.) *Rivista Combustibili*, 6, 628-640 (1952) October.

The Ripalta gas field gives a 98% CH_4, 2% N_2 gas which yields 0.02 to 0.03 g/cu.m. of natural gasoline. Analyses made by usual American methods are reported. Naphthenes, (mono and dicyclic) make up 66.2%, aromatics 32.6%, paraffins 0.5%. The sulfur content is as follows:

Hydrogen sulfide	trace
Free sulfur	trace
Mercaptans	0.10
Disulfides	0.20
Aliphatic and saturated cyclic	1.11
Aromatic and heterocyclic	0.35
Residual sulfur	0.14
Total sulfur	1.90%

Tabulated analyses of gasoline fractions are given. S. Sensi

Thompson, B. J. MAJOR NATURAL GAS CONSERVATION PROJECT. *Petroleum Eng.*, 25, C5-C12 (1953) January.

A description is given of the Ringwood plant, jointly operated by the Oklahoma Natural Gas Co. and Warren Petroleum Corp., designed to recover LP-gas and natural gasoline from natural gas wells. No data on plant throughout or products is given. W. G. Bair

H_2S Removal

Sailors, H. R. (assigned to Phillips Petroleum Co.) REMOVAL OF HYDROGEN SULFIDE. U.S. 2,624,694 (1953) January 6.

Hydrogen sulfide is removed from hydrocarbon gases and liquids by contact with a solution of cadmium sulfate in 25-75% sulfuric acid, at a temperature below 150° F. The cadmium sulfide thus formed is converted to cadmium sulfate in the regeneration zone where the desulfurizing reagent is heated to 200-300° F. C. E. Hummel

LP-Gas Fire Protection

Hamilton, A. B. HOW HARTFORD ASSURED SAFE OPERATION OF LP-GAS STORAGE TANKS. *Gas Age*, 110, 34-35 (1952) December 18.

Addition of three 30,000 gal. tanks to existing three necessitated new sprinkler system, relocation of loading rack, housing for one chemical extinguisher, inspection each shift, and increased fencing. Author's Abstract

LP-Gas Legislation

Kreutzer, A. C. SUMMARY OF STATUTES AND REGULATIONS GOVERNING LIQUEFIED PETROLEUM GAS OPERATIONS IN THE UNITED STATES. *Butane-Propane News*, 15, 90-92, 94, 96, 98 (1953) January.

A state by state resume of existing laws applying to the LP-gas industry. In the main these laws regulate the safe storage, distribution and use of LP-Gas. Most significant new legislation would place a motor-fuel tax on LP-gas so used. W. G. Bair

LP-Gas Markets

Benz, G. R. and Tucker, P. W. LPG SALES REGISTER MODEST ADVANCE. IN 1952. *Petroleum Refiner*, 32, 66-69 (1953) January; *Gas Age*, 111, 34-36, 71-72 (1953) January 15; *Nat. Petroleum News*, 45, 33-36 (1953) January 14; *Butane-Propane*, 15, 74-76, 128-129 (1953) January; *Gas*, 29, 32 (1953) January; *LP-Gas*, 13, 125-127, 207 (1953) February; *Am. Gas Assoc. Monthly*, 35, 20 (1953) January; *Oil Gas J.* 51, 58 (1952) December 29; *World Oil*, 136, 212, 214 (1953) February.

Sales of LP-gas are estimated at 4,110 million gal. or 6.7% more than in 1951. Delay in completion of several large plants and many tank cars due to steel strikes, and the increased demand for ethylene and ethane from refinery sources, were responsible for this modest advance in LP-gas sales. Aggressive sales, suitable sales promotion efforts, and better transportation facilities will be needed to sell additional production in 1953. Production and use statistics are given. D. C. Gami

Carney, B. R. and Meyer, R. E. LIQUEFIED PETROLEUM GAS AS CHEMICAL RAW MATERIAL. *Oil Gas J.*, 51, 117, 128-130 (1952) December 15.

An analysis of present usage of LP-gas is given. The prediction that increased production of LP-gas will be accompanied by increased cost of LP-gas. Producers can make as much money by selling LP-gas as fuel as they can by selling to chemical markets. Chemical consumers should begin thinking about paying slight premiums for their new material. W. G. Bair

LP-Gas Pioneers

Serif, M. . . . 41 YEARS AGO MEN OF VISION FORESAW THIS. . . . *LP-Gas*, **13**, 55-58, 93 (1953) January.

The story of how the four men, Arthur N. Kerr, the late Chesie L. Kerr, Frank P. Peterson and Dr. Walter O. Snelling started the LP-gas Industry is told. A sketch of Dr. Snelling's life is given. D. C. Gami

LP-Gas Underground

Fossan, N. E. SUBSURFACE STORAGE OF LIQUID HYDROCARBONS. *Petroleum Eng.*, 25, A53-A58 (1953) January.

Formation of storage vaults for LP-gas has been accomplished by washing out suitable underground salt veins. Much time must be spent in obtaining all possible information about the underground strata at the proposed site of the venture. Total cost of the project will probably be in the range of 50¢ to $2/bbl. of storage required. At present about 3,000,000 bbl. of underground storage are in use.

W. G. Bair

Low Pressure Distribution

Dye, G. G. HOW SOUTHERN CALIFORNIA COMPANIES PROTECT LOW PRESSURE DISTRIBUTION SYSTEMS. *Gas Age*, **110**, 27-30, 77-82 (1952) December 4.

These companies have set up rigid standards of vault construction and ventilation; they protect regulator valves from abrasive material with filters; they follow a periodic maintenance program; and in addition they are using relief and shutoff valves to prevent excessive pressure in low pressure districts.

R. A. Brown

Meter Problems

Armitage, S. GENERAL THOUGHTS ON GAS METER DESIGN. *Gas Times* (British), 73, 432, 437, 440 (1952) December 26. *Gas J.* (British) 273, 404, 407-409 (1953) February 18.

Extracts and discussion of a paper to the Eastern Junior Gas Association are given. Pressure loss in meters, materials of construction, with emphasis on diaphragms, types of meters and effect of butane-air on meter dressing are discussed. R. A. Brown

Odorization

Abbott, A. H. TESTING AND RECORDS HELP DETERMINE ADEQUATE GAS ODORIZATION RATE. *Am. Gas J.*, **178**, 21, 29 (1953) January.

Various methods of determining the odor level of gas are briefly discussed. An apparatus is described which provides controlled air-gas mixtures to be smelled by an observer who also tests the mixture with a combustible gas indicator. Three defined levels of odor intensity (faint, distinct, and strong) are tested. The application of this instrument to odorization problems is discussed. C. E. Hummel

Pollock, H. B. (assigned to California Research Corp.) ODORANT FOR GASEOUS FUELS. U.S. 2,625,518 (1953) January 13.

This blended odorant is composed of approximately equal parts of tetrahydrothiophene and a mixture of organic sulfides. Thermal stability, resistance to oxidation, and good volatility and odor characteristics are claimed. Odorizing rates of less than 2 lb/MMCF gave adequate odorization in room and field tests. The presence of less than 1% by weight of mercaptans in the odorant is also covered in the claims.

Abstractor's note: The physical properties listed for the blended odorant indicate that it resembles the commercial odorant, *Calodorant "C" Special.* C. E. Hummel

ODORIZATION AND CONTROL OF NUISANCE ODORS CONTINUE AS BIG GAS INDUSTRY PROBLEMS. *Am. Gas J.*, **177**, 17, 28 (1952) December.

The use of room tests, odor intensity meters, and records of leak complaints to indicate the odor level of gas are discussed. Physical and chemical conditions met in the distribution and utilization of gas, which cause reduced effectiveness of odorants are described. Odorizing equipment and effective odor control practices at odorizer stations are reviewed.

C. E. Hummel

Pipe Line Cleaning

Biederman, K. C. ISOTOPES TRACE PIGS IN PIPE LINES. *Oil Gas J.*, **51**, 124-130 (1952) December 15.

The article deals with the experience of Brown and Root, Inc., and concludes that satisfactory results can be obtained when a sufficiently large amount of radioactive material is used under expert supervision. I. P. Patel

Pipe Line Expansion

Child, R. S. NATURAL GAS FROM THE GULF. *Public Utilities Fortn.*, **51**, 95-99 (1953) January 15.

United Gas Corporation's new gathering system is bringing offshore gas from the Gulf of Mexico to the inland markets. 1000 miles of new line ranging from 6 in. to 30 in. has been laid to bring the system capacity to 4 billion CF/day. W. G. Bair

Love, F. H. WELL OVER THE BILLION MARK. *Petroleum Eng.*, **25**, D26-D30 (1953) January.

Tennessee Gas & Transmission Co. has added 528 mi. of pipe and 93,900 hp. thereby boosting capacity to 1.3 billion CF/day.
J. D. Parent

Vivian, C. H. GROWTH OF A NATURAL-GAS SYSTEM. *Compressed Air*, **58**, 2-8 (1953) January.

A brief history of the natural-gas system and the description of compressor stations of Northern Natural Gas Co. are given. D. C. Gami

Pipe-Storage of Gas

Grant, W. C. SAN DIEGO WILL STORE 10,000,000 cu.ft. IN UNDERGROUND PIPE HOLDER. *Gas Age*, **110**, 30-31 (1952) December 18.

Additions to their storage facilities by San Diego Gas & Electric Co. include 10 MMCF. to be stored in 40,000 ft. of 30-in.-diam. buried pipe, and the installation of a new compressor on the main supply line so that 10 MMCF. of storage can be maintained by line pack in this 50-mile, 16-in.-diam. line. O. T. Bloomer

Production Problems

Brooks, C. S. and Purcell, W. R. SURFACE AREA MEASUREMENTS ON SEDIMENTARY ROCKS. *J. Petroleum Techn.* **4**, 289-296 (1952) December.

A description is given of the apparatus and procedure employed in the determination of the surface areas of sedimentary rocks, and values are reported for a variety of sandstone and limestone cores. In addition, consideration is given to the Kozeny equation, which relates surface area to porosity and permeability. A comparison is made between the surface areas as calculated from this equation and the geometrical areas of a series of packs of spherical glass beads. Also, for a group of sandstone cores, Kozeny areas are compared with surface areas as determined by the gas adsorption method employed in this investigation. Authors' Abstract

Chisholm, F. and Green, B. Q. HOW TO TRAIN MUD ENGINEERS. *World Oil*, **136**, 115-120 (1953) January.

This first section describes the procedures and equipment used to determine the mud density and viscosity in the laboratory and in the field.
D. C. Gami

Cornell, D. NEW METHOD ESTIMATES GAS WELL PERFORMANCE. *World Oil*, **136**, 180-184 (1953) January.

A method of estimating gas well deliverability is given. A plot of $(Ps/Pf)^2$ vs logarithm of time is a straight line after a short initial period. This straight line could be extrapolated to obtain bottom-hole drain-down pressure.
D. C. Gami

Howard, G. and Bearden, W. G. NEW MULTIPLE FRACTURING PROCESS. *World Oil*, **136**, 159-162 (1953) January.

The purpose of multiple fracturing is to increase the number of flow channels into the well bore. It is done by plugging the old fractures by a suitable plugging agent soluble in crude oil after a certain length of time, and creating new ones by forcing the fracturing fluid against producing formations. This method increases the total recovery of a well.
I. P. Patel

Texas Commission Rules

Carlson, R. F. TEXAS RAILROAD COMMISSION RULES, REGULATIONS: 2. GAS-WELL POTENTIALS AND GAS ALLOW-

ABLES. *Oil Gas J.*, 51, 93, 94, 97 (1953) January 12.

After a well (oil or gas) has been drilled and completed, and the proper reports have been made to the Texas Railroad Commission (see *Gas Abs.* 9, 18, Feb. 1953), a different series of reports on production then are required by the Commission. These are outlined here. Under Rule 24, Form GWT-1 must report the results of the back pressure test; and from these and the shut-in well-head pressure, the daily open-flow potential is estimated and allocation of production is established. Under Rule 25, the well production is held to 25% of the above potential and monthly reports are made as follows: Forms 3-266A and B on production and disposition; Form GN, on gas purchased, or used on lease; Form GO-1 on oil and condensate production. New allocations are based on totals of all well reports and the tract acreage, and are subject to rechecks under inspectors. O. P. Brysch

Carlson, R. F. TEXAS RAILROAD COMMISSION RULES, REGULATIONS. 3. PIPE-LINE MOVEMENT OF CRUDE OIL. *Oil Gas J.*, 37, 110-113, 122 (1953) January 19.

The Texas Railroad Commission has adopted 20 rules which set up the condition which transporters of crude oil must meet with regard to charges, claim, tariffs, and measurement specifications of pipe line crude. These rules and the supplemental orders also issued are presented in the paper. H. A. Dirksen

Underground Storage

Wheeler, H. P., Jr. and Eckard, W. E. UNDERGROUND STORAGE OF NATURAL GAS IN COAL-MINING AREAS. U.S. Bureau Mines Inf. Circ. 7654 (1952) December.

A brief elementary review of the history, objectives and requirements for the underground storage of natural gas. It presents hazards of storing gas underground in coal mining areas, gives steps in choosing a location for underground storage, the development of the field, the necessity for locating and plugging old wells in an abandoned field, and the absolute requisite that the field be gas tight. It emphasizes the need for natural gas and coal industries to work together for public safety and industry, when storing gas underground in coal-mining areas. E. S. Pettyjohn

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Bemis, J. M. NATURAL GAS FOR PACIFIC NORTHWEST. p. 42

Smith, F. C. GAS ATTAINS NEW HEIGHTS IN 1952. p. 41

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Argentine Toluene

Swift, J. J., Stiles, S. R., Howard, E. W. and Tarnpoll, M. AROMATICS RECOVERY BY HYDROFORMING AND PHENOL EXTRACTION. *Petroleum Processing*, 8, 81-87 (1953) January; *Petroleum Refiner*, 32, 105-109 (1953) February.

The new Hydroforming and aromatics extraction plant in Argentina was built primarily to make nitration-grade toluene. Design flexibility is such, however, that it has successfully produced nitration-grade benzene and finished aviation gasoline of 91/98 and 100/130 grades. The Hydroformer of Planta K, as it is known, consists of a fixed-bed unit with two reactors, of the basic design of previous units. The aromatics recovery system for extracting pure aromatics from the Hydroformer crude concentrate uses the phenol extraction principle. For purposes of military security, capacity figures and similar data are omitted.

Authors' Abstract

Catalysts

Barker, J. W. (assigned to Houdry Process Corp.) APPARATUS FOR FLOWING GASES THROUGH BEDS OF FLUENT GRANULAR SOLIDS. U.S. 2,625,467 (1953) January 13.

An apparatus for regenerating coke catalyst from hydrocarbon conversion processes is described. E. J. Pyrcioch

Naragon, E. A., Vergilio, J. H., and Millendorf, A. J. (assigned to The Texas Co.) REGENERATING COBALT CATALYSTS BY OXIDATION. U.S. 2,626,246 (1953) January 20.

A process for regenerating cobalt catalysts and for the catalytic conversion of carbon mon-

oxide, hydrogen and olefin into carbonylic products which consists essentially of contacting the spent catalyst with a mixture of 1-25% oxygen and 75-99% nitrogen at a temperature of 100-400° F. for at least 4 hours.

H. A. Dirksen

Oil Origins

Morton, F. THE ORIGIN OF PETROLEUM. *Petroleum Eng.*, 25, A60-A70 (1953) January.

Various historical as well as present-day theories of the origin of petroleum are discussed. The Tulsa Geological Society Survey and Trinidad Leaseholds surveys indicate that the oil is formed by shallow depth of burial and moves to the adjacent rocks shortly thereafter, and that variations in oil type are due to variations in source material and environment. The exact mechanism by which source material is converted to petroleum is still in doubt.

D. C. Gami

Petroleum Availability

Swearingen, J. E. and Boatwright, J. W. MEETING FUTURE PETROLEUM DEMANDS. *Oil Gas J.*, 51, 328-343 (1952) November 17.

The two authors analyze the probable availability of crude oil and natural gas liquids during the next 15 years. Domestic production of nine million barrels per day of crude oil and natural gasoline is forecast for 1967. To reach this producing capacity 49 billion barrels of crude oil would have to be found and developed in 15 years. Only 42 billion barrels have been discovered to date (production plus reserves). The authors, on the basis of the data presented, are confident that supplies will be adequate.

H. R. Linden

Refining Capacity

Tuttle, R. B. SURVEY OF OIL REFINERIES. *Oil Gas J.*, 51, 303-316 (1952) December 22.

Total world refining capacity is now nearing 14,000,000 bbl. daily input of crude oil. Of this the U.S. has 7.3 million bbl./day, the Communist areas 1.1 million bbl./day and all other 5.5 million bbl./day. Refineries of each country are tabulated as to ownership, size, and type of operation.

D. M. Mason

7. ANALYTICAL METHODS AND TESTS

Air Pollution Tests

McCabe, L. C. ATMOSPHERIC POLLUTION. *Ind. Eng. Chem.*, 44, 99A-102A (1952) December.

Air pollution studies conducted at New Haven, Conn. and Los Angeles County are briefly discussed. A low cost automatic air filter is described which aspirates air through filter paper, thus providing a sample which can be evaluated by blackness measurements or by chemical and physical tests.

C. E. Hummel

Aromatics by Infrared

Williams, R. B., Hastings, S. H., and Anderson, J. A., Jr. DETERMINATION OF INDIVIDUAL ALKYL AROMATIC HYDROCARBONS. *Anal. Chem.*, 24, 1911-1918 (1952) December.

As a result of process research studies on segregating aromatic hydrocarbon fractions for possible use as chemical raw materials, it became necessary to determine many individual aromatics over a wide molecular weight range. Procedures involving distillation plus infrared spectrometric analysis have been developed for determining essentially all of the individual alkyl benzene hydrocarbons through the C_{18}'s. Techniques are presented for achieving the infrared analysis, including a simple method for linearizing aromatic absorptivities that is an improvement over previous methods. Composition data of particular interest to the petroleum technologist are given which cover in great detail a few typical refinery aromatic stocks of C_8, C_9, and C_{10} molecular weight range.

Authors' Abstract

Gas Gravity

Quirk, J. M. GAS GRAVITOMETERS. *Instruments*, 26, 102-104, 149-153 (1953) January.

Important factors in the measurement of specific gravity of gas include instrumental methods and temperature and pressure factors. The "Ranarex" gas gravitometer is described in detail, including principle, operation, refinements, auxiliary equipment, and maintenance.

Author's Abstract

Fractionation

Herington, E. F. LABORATORY FRACTIONATION. *Chem. & Ind.* (British) 26-30 (1953) January 10.

The art of laboratory batch fractional distillation within the pressure range 20-760 mm pressure is reviewed. D. M. Mason

Free Radical Spectrometry

Ingold, K. U. and Lossing, F. P. FREE RADICALS BY MASS SPECTROMETRY. III. RADICALS IN THE THERMAL DECOMPOSITION OF SOME BENZENE DERIVATIVES. *Canad. J. Chem.*, 31, 30-41 (1953) January.

The following benzene derivatives have been pyrolyzed in a free-radical mass spectrometer: benzene, toluene, benzaldehyde, anisole, diphenyl, ether, and benzyl ether. The products and intermediates were analyzed, particular attention being paid to the formation (and stability) of any aromatic free radicals found. The phenyl, benzyl, phenoxy, and benzoyl radicals, as well as atomic carbon, were detected. The first two could be obtained abundantly and are fairly stable below 1150°. The oxygenated radicals were much less abundant and appeared to be less stable. Authors' Abstract

Hydrocarbon Types

Sobcov, H. RESOLVING NORMAL AND ISOMERIC PARAFFINS IN COMPLEX HYDROCARBON MIXTURES. *Anal. Chem.*, 24, 1908-1911 (1952) December.

An extension of the hydrocarbon-type analysis method allows the separate determination of normal paraffins and isoparaffins in approximately single carbon-number saturate paraffin groups. D. V. Kniebes

Micro-Flash-Point

McCutchan, P. and Young, D. A. MICRODETERMINATION OF FLASH POINT ON PETROLEUM PRODUCTS. *Anal. Chem.*, 24, 1974-1979 (1952) December.

The procedure and equipment, as developed, allow the observation of a visible flash from 0.3 ml. of sample heated in a flash chamber drilled into an aluminum block. The precision is excellent and the apparatus is simple to construct and operate. The values obtained are the same as from the Cleveland open cup procedure, ASTM D 92-46, which requires approximately 70 ml. of sample. Authors' Abstract

Oil-Sulfur Corrosion

Patton, R. A. and Lieblich, J. H. A MODIFIED METHOD FOR THE ESTIMATION OF CORROSION DUE TO THE FREE SULFUR AND SULFUR COMPOUNDS IN OILS. *Am. Soc. Testing Materials Bull.*, No. 186, 59-66 (1952) December.

The literature background of the ASTM Copper Strip Method for estimating the corrosive nature of oils is replete with references to the interferential origin of the colors observed. Despite this fact, no comprehensive analysis of the bases for the established empirical procedure has been found. Furthermore, the several attempts to devise an acceptable, more quantitative picture have been only partially successful. Even so, where success has been achieved, the methods used have not seemed practical from a routine control viewpoint. In this paper, the optical phenomena involved are examined in some detail in order to permit an estimation of the reliability of the present procedure of visual examination. A modified procedure is then described and an appraisal of its merit outlined. Finally a direct comparison of the two proceduree is set forth.

Authors' Abstract

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Cooper, J. AUTOMATIC GAS RECORDERS. p. 58

Hulme, C. COKE FOR BLAST FURNACES. p. 46

Patzelt, H. STEAM CONDENSATE CORROSION INHIBITORS. p. 60

ODORIZATION AND CONTROL CONTINUE AS INDUSTRY PROBLEMS. p. 49

8. GENERAL AND PHYSICAL CHEMISTRY

Critical Properties

Gore, T. L., Davis, P. C. and Kurata, F. PHASE AND VOLUMETRIC BEHAVIOR OF NATURAL GASES AT LOW TEMPERATURES. *J. Petroleum Techn.*, **4**, 279-284 (1952) November.

An experimental method and apparatus for the study of the low-temperature phase and volumetric behavior of volatile mixtures are described. A limited portion of the phase diagrams of two natural gas mixtures was determined at temperatures from -40°F to -200°F and pressures to 1200 psi. The main value of the data lies in the reported experimental critical properties of the mixtures.
Abstracter's note: The apparatus is essentially a copy of the Institute of Gas Technology apparatus although no mention is made of this fact. O. T. Bloomer

Diffusion and Viscosity

Rowlinson, J. S. and Townley, J. R. THE APPLICATION OF THE PRINCIPLE OF CORRESPONDING STATES TO THE TRANSPORT PROPERTIES OF GASES. *Trans. Faraday Soc.* (British) **49**, 2027 (1953) January.

The principle of corresponding states is used cessfully to compare the viscosity and diffusion coefficients of many pure and mixed gases. The viscosities of some polyatomic gases, though, are consistent neither with those of simple gases nor with their own second virial coefficients. This is probably due to inelastic collisions in such gases. Two direct tests are made of the relations: $\sigma_{12} = 1/2(\sigma_{11} + \sigma_{22})$; $E_{12} = E_{11}^{1/2} E_{22}^{1/2}$, between the collision diameters σ and the energies E of like and unlike interactions. The first test uses the viscosity of a binary mixture of similar gases. Measurements on five mixtures confirm the relations within 1½%. The second is made by comparing the self-diffusion coefficients of six pure gases with the interdiffusion coefficients of thirteen mixtures. The latter are about 2% larger than these relations predict. The relations are also shown to apply, within 3%, to the non-polar part of the interaction of water vapour with five other gases.
Authors' Abstract

Equilibrium Method

Ablewhite, S. A., Bowden, C. H. and Coke, E. V. AN IMPROVED METHOD FOR THE DETERMINATION OF VAPOUR-LIQUID EQUILIBRIUM DATA. *Chem. & Ind.* (British) **59**, 1146-1147 (1952) November 22.

An improved method for obtaining vapor-liquid equilibrium data is described. Nitrogen is bubbled through a liquid mixture and the vaporized material in the nitrogen stream is collected in a trap at dry ice temperature. The collected vapor, the original charge, and the residual liquid are analyzed. From this data the usual y — x diagram can be constructed. The method yields results comparable in accuracy to the Othmer still. Less skill is required for operations and the results are obtained in less than one-third of the time. The error introduced by non-attainment of equilibrium is discussed and it is concluded that for most systems it will be negligible.
O. T. Bloomer

Heat of Adsorption

Dean, R. B. and Hayes, K. E. THE SORPTION OF VAPORS BY MONOLAYERS. V. THE DIFFERENTIAL HEATS OF ADSORPTION OF n-HEXANE ON STEARIC ACID MONOLAYERS. *J. Am. Chem. Soc.*, **74**, 5982-5984 (1952) December 5.

Adsorption of n-hexane on stearic acid monolayers have been calculated from measurements of surface pressure at 30° C. Differential heats of sorption at 25° C. have been calculated from these and from data previously reported at 30° C. The results are shown to be inconsistant with the B.E.T. adsorption theory.
O. T. Bloomer

Hydrocarbon Data

Bauer, C. R. and Middleton, J. F. ENTHALPY OF PETROLEUM FRACTIONS. *Petroleum Refiner*, **32**, 111-113 (1953) January.

Using new data on latent heat and vapor specific heat, the Hanson and Hurd correlation for predicting enthalpies of petroleum fractions is revised. A new chart of enthalpy versus temperature is presented. C. D. Gami

Nickel Carbonyl

Ladell, J., Post, B. and Fankuchen, I. THE CRYSTAL STRUCTURE OF NICKEL CARBONYL, NI(CO)4. *Acta Crystallographica*, 5, 795-800 (1952) November 10.

The crystal structure of nickel carbonyl has been determined. Single-crystal oscillation diagrams have been obtained at -55 ± °C. These have been indexed on the basis of a cubic unit-cell with $a_0 = 10.84 \pm 0.02$ A. There are 8 molecules per unit cell. The most probable space group is Pa3. Electron-density projections indicate that the configuration of the molecule is that of a regular tetrahedron. The analysis of one- and two-dimensional sections of three-dimensional Fourier syntheses indicates the following bond lengths: Ni-C = 1.84 ± 0.03 A, and Ni-O = 2.99 ± 0.03 A. These are in good agreement with known values determined by means of electron diffraction. The calculation of the electron density along a cube diagonal indicates that the atomic arrangement is Ni-C-O and not the alternative possibility Ni-O-C. Authors' Abstract

Spectra: $H_2O + CO_2$

Taylor, J. H., Benedict, W. S., and Strong, J. INFRARED SPECTRA OF H_2O and CO_2 at 500° C. *J. Chem. Phys.*, 20, 1884-1898 (1952) December.

A porcelain-lined absorption cell of the Pfund type is described, in which 3 meters of gas may be heated to temperatures above 500° C. The spectra of air at atmospheric pressure containing varying amounts of H_2O and CO_2 have been obtained in this cell between 2.4-15 microns with a prism spectrometer, and between 13-25 microns with a grating spectrometer giving spectral resolution of about 2 cm^{-1}. A number of new lines in the pure rotation spectrum and the ν_2 vibration of H_2O, originating from levels of high energy, have been observed and classified. New CO_2 bands in the regions of 11-20 and 5 microns have also been observed, originating from levels as high as 5 ν_2, and leading to improved values of higher-quanta levels of ν_2 and vibrational constants for this molecule. Authors' Abstract

Vapor Pressures

Brown, O. L. I. THE CALCULATION OF VAPOR PRESSURE CURVES FROM DATA AT ONE TEMPERATURE. A STUDY OF THE HILDEBRAND RULE. *J. Am. Chem. Soc.*, 74, 6096-6098 (1952) December 5.

All liquids obeying the Hildebrand rule will fall on the same curve of log (P_{mm}/T) versus log (T/Θ). Log Θ is a constant, obtained from any one pair of P and T values. A standard table is presented by means of which the entire vapor pressure curve of any liquid obeying the Hildebrand rule may be calculated from data at a single temperature. Departures from the rule are presented as a function of vapor volume in the case of some hydrocarbons. It is found that for straight-chained paraffin hydrocarbons the excess entropy of vaporization at constant vapor volume is a linear function of the number of carbon atoms from 4 to 12 carbon atoms. Author's Abstract

9. ORGANIC CHEMISTRY

Acetylene Economics

Weaver, T. ECONOMICS OF ACETYLENE BY WULFF PROCESS. *Chem. Eng. Progress*, 49, 35-39 (1953) January.

The recent commercial operation of the Wulff process has favorably changed the economic picture of the use of acetylene for chemical synthesis in areas which are far removed from sources of calcium carbide. Data are presented comparing the total costs of acetylene when using propane, ethane, and natural gas as feed stocks for the Wulff process, with the total costs of carbide acetylene in two dissimilar geographic locations. J. M. Reid

Carbazole Separation

Bruijn, P. H. (assigned to De Directie Van De Staatsmijnen in Limburg) PROCESS FOR THE SEPARATION OF ANTHRACENE, PHENANTHRENE, AND CARBAZOLE. U. S. 2,622,087 (1952) December 16.

A method is presented for the separation of mixtures of anthracene, phenanthrene, and carbazole, by the use of sulfuric acid. This new precedure does not involve the use of filters

and centrifuges, as older methods did. The loss of valuable products due to sulfonation is also substantially eliminated. R. Parker

Chemicals Expansion

Reidel, J. C. PROGRESS IN PETROLEUM . . . . THE STORY OF PHILLIPS PETROLEUM'S PETROCHEMICAL EXPANSION. *Oil & Gas J.*, 51, 82-90 (1953) January 12.

A description of the operations of the Phillips Chemical Co., a subsidiary of Phillips Petroleum Co. Rapid expansion has featured the company since its formation in 1948. Products include carbon black, ammonia, sulfur and several polymer products. Phillips produces one third of the world supply of carbon black used in rubber compounding. W. G. Bair

EXPANSION GOALS 99.7% FILLED. *Petroleum Processing*, 7, 1793-1800 (1952) December.

The total investment of $800 million is authorized to meet needs on petrochemicals. A list of company names, amount authorized, products, raw materials, completion date and name of contractor is given. The list is classified according to the products. D. C. Gami

Ethylene Production

King, C. C. and Warburton, J. ETHYLENE FROM NAPHTHA OR GAS-OIL CRACKING. *Oil Gas J.*, 51, 92-97 (1952) December 8.

The article outlines the basically European process for olefin production (ethylene and propylene are major products) from gas oil or heavy naphtha. The cracking is done in the presence of superheated steam, at 1700° F., and 1-2 sec. contact time. Olefin yields of 35 wt.% of the feed are claimed. Product separation is by low temperature fractionation using propane, ethylene, and methane refrigerating systems. A high-purity ethylene (99.5 to 99.9%) can be obtained. W. G. Bair

LP-Gas Chemicals

Carney, B. R. and Meyer, R. E. LIQUEFIED PETROLEUM GAS AS CHEMICAL RAW MATERIAL. *Oil Gas J.*, 51, 117, 118, 128-130 (1952) December 15.

The major petrochemical products are classified according to the source hydrocarbon. In 1951 about 28 million bbl (5,403 million lb) light hydrocarbons were used in chemicals. Future supply and demand is predicted. All indications point to a higher price for LP-gas if the demand increases. More complete extraction from natural gas would yield an additional 64 million bbl./year at an increase of only 2.5 cents/gallon. W. G. Bair

10. CHEMICAL ENGINEERING

Fluidization

Farbar, L. METERING OF POWDERED SOLIDS IN GAS-SOLIDS MIXTURES. *Ind. & Eng. Chem.*, 44, 2947-2955 (1952) December.

By taking an energy balance between any two points in a gas stream containing solids in suspension and assuming (1) incompressible and essentially isothermal flow (2) fluid and solids frictional losses to be proportioned to the square of the average fluid velocity, an equation is derived relating the pressure drop through a flow meter (nozzle) with the flow rates, physical properties and dimensions of the system. Several series of experiments with flow nozzles of different diameter, either in horizontal or vertical pipe runs, using alumina-silica catalyst suspended in an air stream, demonstrated that the pressure differential across the meter (1) increased almost linearly with solids flow rate at constant air flow rate and (2) varied with the square of the air-flow rate at constant solids flow rate. When plotting the meter pressure-drop against solids flow rate, a family of nearly straight lines is obtained having approximately a constant intercept (for constant air-flow rate) with their respective slopes depending on nozzle diameter and air flow rate. C. von Fredersdorff

Hemminger, C. E. (assigned to Standard Oil Development Co.) SUPPLY OF HEAT TO FLUIDIZED SOLIDS BEDS FOR THE PRODUCTION OF FUEL GAS. U. S. 2,619,415 (1952) November 25.

A method of heating fluid-solids beds is described which uses heat-transfer coils of conventional type inside the reactor or regenerator (in a 2-shell unit) in direct contact with the

fluid bed. These coils carry high-temperature fluids such as "Dowtherm" or flue gases. The method has wide application and is limited in temperature range only by materials of construction. W. G. Bair

Lewis, E. W. and Bowerman, E. W. FLUIDIZATION OF SOLID PARTICLES IN LIQUIDS. *Chem. Eng. Progress*, 48, 603-610 (1952) December.

The authors present data and correlations for the fluidization of fine nonuniform sized solids. The results are based on theory presented by previous work on the fluidization of uniform solids. The range of flow resistance encountered in chemical engineering practice has been investigated and correlated. These results can be used to predict the performance of batch liquid-solid fluidized systems. R. E. Peck

Gas Separation

Harlow, E. V. (assigned to Koppers Company) FRAME DIFFUSION APPARATUS. U. S. 2,618,357 (1952) November 18.

An apparatus for the separation and concentration of gases by diffusion is described. The direction of the flow of the fuel gas and sweep medium is at right angles to each other.
D. C. Gami

Heat Transfer

Monroe, A. G., Bristow, H. A. and Newell, J. E. HEAT TRANSFER TO BOILING LIQUIDS AT LOW TEMPERATURES AND ELEVATED PRESSURES. *J. Appl. Chem.* (British), 2, 613-624 (1953) November.

Previous work on heat transfer to boiling liquids is reviewed. Heat transfer to oxygen and nitrogen boiling inside tubes at pressures rom atmospheric to 2000 psig has been studied experimentally. The boiling coefficient was found to diminish with increasing temperature difference, and improve with increasing fluid flow rate. At pressures above the critical the rate of heat transfer is influenced by the absolute temperature of the fluid. I. P. Patel

Moss, J. HEAT TRANSFER — CONDUCTION; HEAT TRANSFER BETWEEN FLUIDS AND SURFACES; FLUIDISED BEDS; HEAT EXCHANGERS; BOILING AND CONDENSATION; RADIATION; GAS TURBINES; ROCKETS; INDUCTION HEATING; ANALOGUE METHODS. *Chem. & Process Eng.* (British) 33, 603-606 (1952) November.

Published work in heat transfer presented in London September 1951 by the ASME and the IME is reviewed, as well as other books and journal publications during 1951-52. The general fields included are conduction, surface film coefficients, heat transfer in fluidised beds, heat exchangers, boiling and condensation, radiation, gas turbines, rockets, induction heating and analogue methods. R. E. Peck

Ogorzaly, H. J., and Rex, W. A. (assigned to Standard Oil Development Co.) TRANSFER OF HEAT TO FLUIDIZED SOLIDS BED. U. S. 2,619,451 (1952) November 25.

This refinement of patent U. S. 2,619,415 offers specific improvements for utilizing combustion gases as heating mediums. Ceramic cores are placed in the heating coils to improve turbulence on the gas side. Complete combustion of the inlet flue-gas is achieved instead of partial combustion. W. G. Bair

Thomas, R. THERMAL INSULATION FOR INDUSTRIAL REQUIREMENTS. *Petroleum Refiner*, 32, 107-113 (1953) January.

The article covers basic calculations for heat transfer from planes and cylinders.
W. G. Bair

Pneumatic Conveying

Pinkus, O. PRESSURE DROPS IN THE PNEUMATIC CONVEYANCE OF SOLIDS. *J. Appl. Mech.*, 19, 425-431 (1952) December.

Experimentally measured frictional losses in the pneumatic conveying of various sizes of sand particles in a horizontal pipe line confirmed theoretical equations derived from a consideration of the force balance around the system. The pressure loss seemed to be a linear function of both solids flow and gas flow rates. The equations developed apply for a given size solid only and do not take into account variations in the size distribution.
C. von Fredersdorff

Separation Processes

Hachmuth, K. H. INDUSTRIAL VIEWPOINTS ON SEPARATION PROCESSES. *Chem. Eng. Progress*, 48, 523-527, October; 570-574, November; 617-626 (1952) December.

Generalizations are developed on industrial applications in the first part of the paper. These are then discussed with reference to calculation of distillation, absorption, and solvent extraction processes using the absorption factor method to estimate final operating results. The final part discusses similar solutions of separation problems in azeotropic distillation, using ketone: n-heptane: toulene as an example, and in extractive distillation, using cis-2-butene and n-butane. D. M. Mason

Tube Still

McLaren, J. THE PRACTICAL DESIGN OF A TUBE STILL. *Chem. & Process Eng.* (British), 33, 668-670 (1952) December.

The design of a light-oil tube still based on an empirical equation is presented. The method applies to cubically-shaped stills with radiation and convection tube sections.

E. J. Pyrcioch

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Butterfly Valves

Dally, C. A. BUTTERFLY CONTROL VALVES. *Instruments*, 25, 1717-1719, 1761-1764 (1952) December.

An analysis of butterfly control valve action, operating torque, motor operator selection, turn-down ratio, and control action are discussed. Butterfly valves are particularly adapted to flows involving solids suspended in fluids.

W. G. Bair

Computing Devices

Barnes, K. B. NEW BRAINS FOR OIL. *Oil Gas J.*, 51, 138-140 (1952) December 22.

The Texas Petroleum Research Committee's Fifth Oil Recovery Conference was held at Texas A & M in December. The symposium was on the use of general purpose punched-card computing systems in solving petroleum engineering problems. Seeligson Engineering Committee uses punched cards to record oil, gas and water production data, core-analysis and other information. Shell Oil (West Texas division) uses punched cards to speed up calculations of crude-oil run tickets. Magnolia Petroleum Co. of Dallas runs integrator indexes for each of 14,000 orifice meter charts. A special editorial section entitled: "High speed business machines—punched cards—electronic calculators" containing all the papers presented at this conference will appear in the *Oil Gas J.*, February 2, 1953.

C. A. Simms

Fritz, N. L. ANALOG COMPUTERS FOR COORDINATE TRANSFORMATION. *Rev. Sci. Instruments*, 23, 667-671 (1952) December.

Problems in multicomponent analysis frequently require repetitive solutions of a set of simultaneous equations in which the coefficient terms do not change. In these cases it is advantageous to obtain a general solution from which the specific solutions may be obtained readily with simple instruments. An instrument is described which will solve a three-equation set as rapidly as an operator can set the values on the input dials and will simultaneously present the three answers with an accuracy of better than 0.2 percent of maximum value. A method is presented for calculating the accuracy of computation for use in the design of instruments of this type. Author's Abstract

Heat Exchanges

Holm, S. and Lyerly, R. L. DESIGN AND PERFORMANCE OF AN EXTENDED-SURFACE REGENERATOR FOR A GAS-TURBINE PLANT. *Trans. Am. Soc. Mech. Eng.*, 74, 1163-1166 (1952) October.

A new type of lightweight extended-surface (pin fin) heat exchanger is described for particular application to gas-turbine units for natural gas pipe-line compressor stations.

C. von Fredersdorff

H_2S Detector

Cooper, J. and Thomas, H. H. (assigned to Douglas Pole Welman) AUTOMATIC GAS RECORDERS. U.S. 2,622,015 (1952) December 16.

An automatic device for recording the existence of trace amounts of hydrogen sulfide is

described. Periodically, gas is passed through successive portions of absorbent paper impregnated with lead acetate. The stain produced may be examined through the transparent ends of the gas chamber, or light transmitted through the stain may be observed by photoelectric means and recorded automatically. Inner surfaces of the gas chamber are constructed of a metal which does not react directly with hydrogen sulfide. C. E. Hummel

Line Heating

A.I.O.C. HEATS OIL PIPE LINES WITH ELECTRICITY. *Oil Gas J.*, 51, 252-255 (1952) December 22.

The advantages of low maintenance costs and adaptability to automatic control is claimed to make the heating of pipe lines with electricity attractive in spite of the high operating costs. H. A. Dirksen

Pressure Gages

Pressey, D. C. TEMPERATURE-STABLE, CAPACITANCE PRESSURE GAUGES. *J. Sci. Instruments*, (British) 30, 20-24 (1953) January.

A brief theoretical treatment is given of the effect of temperature changes on capacitance pressure gages. Its use in the design of a sensitive differential pressure gage of range 0-10 mm of water, having a temperature coefficient of capacitance of only 100 p.p.m./°C, is illustrated. Author's Abstract

Thermocouples

Larson, E. V. and Mayer, R. RECORDING AND INDICATING INSTRUMENTS FOR TEMPERATURE MEASUREMENTS DOWN TO 10° K USING COPPER-CONSTANTAN THERMOCOUPLES. *Rev. Sci. Instruments*, 23, 692-694 (1952) December.

This paper briefly discusses the modifications and additions to a standard instrument involved in the solution of the problems encountered in the indication and recording of temperatures as low as 10° K with CC thermocouples as the primary elements. Authors' Abstract

Ross, S. D. and Procopi, J. TRENDS IN REFINERY INSTRUMENTATION. PART V—FABRICATION AND CALIBRATION OF THERMOCOUPLES. *Petroleum Eng.*, 24, C41-C44 (1952) November.

Recommendation for welding techniques for the common thermocouple pairs are given. Detailed instructions for the calibration of new and installed couples against a standard are given. W. G. Bair

Water Treatment

Welsh, E. R. MODERN FEEDWATER TREATMENT PRACTICE. *Can. Chem. Processing*, 36, 32-36 (1952) December.

A general discussion is given of water treatment and trouble spots in normal steam plant operation. The recycle condensate, often overlooked, can be the source of serious corrosion and sludge formation. W. G. Bair

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Armitage, S. GAS METER DESIGN. p. 49

Quirk, J. M. GAS GRAVITOMETERS. p. 52

12. MATERIALS OF CONSTRUCTION

Cathodic Protection

Schwerdtfeger, W. J. and McDorman, O. N. POTENTIAL AND CURRENT REQUIREMENTS FOR THE CATHODIC PROTECTION OF STEEL IN SOILS. *Corrosion*, 8, 391, (1952) November.

Potentials of steel in 20 air-free soils varying in pH from 2.9 to 9.6 were determined in the laboratory. These data and the potential-pH relation for the hydrogen electrode were used in fixing the optimum potential for cathodic protection of the steel against corrosion. The effectiveness for this potential for cathodic protection of steel in soils was confirmed by weight loss measurements on electrodes which were maintained at the selected potential in five corrosive soils. Cathodic polarization curves are interpreted in terms of the potential and current requirements for the protection (cathodic) of steel in soils. R. A. Brown

Corrosion

McFaddin, D. E. CORROSION OF CARBON STEEL IN GAS PROCESSING PLANTS. *Gas*, 28, 105-108 (1952) December.

Conclusions from experience in the Santa Maria oil field are presented. The effect of temperature and pressure of CO_2, H_2S, water, and oxygen, the manner of attack on steel, and protection measures such as use of neutralization agents and protective films are discussed.

D. M. Mason

Gas Piping Code

Taylor, D. M. NEW CODE FOR GAS SYSTEM PIPING IS ON THE WAY. *World Oil*, 136, 210-212 (1953) January.

All portions of the ASA/B-31 code relating to gas piping are being collected into a single revised compilation. Eight subcommittees are working to complete the task this spring.

J. D. Parent

ASA COMMITTEE SPEEDS WORK ON NEW SAFETY CODE. *Gas*, 29, 38-39 (1953) January.

An American Standards Association Committee made up of 65 members is formulating a new code for pressure piping and expects to have the first draft completed by spring. It is the intention of the gas industry that the new code will become a national standard.

E. J. Pyrcioch

Inhibitor Research

Patzelt, H. A LABORATORY METHOD FOR THE STUDY OF STEAM CONDENSATE CORROSION INHIBITORS. *Corrosion*, 9, 11-18 (1953) January.

A laboratory method for studying corrosion in steam condensate systems is described. In brief, a synthetic condensate is produced in a glass tower by aerating heater distilled water with a mixture of carbon dioxide and air. This condensate and a solution of the treatment are proportioned into a test container by gravity feed. A number of steel test-coupons are suspended in the latter and the liquid is mildly agitated with a paddle stirrer. At periodic intervals a specimen is removed from the bath and the weight loss determined. The temperature, free carbon dioxide and dissolved oxygen of the synthetic condensate, and the treatment concentration are controlled throughout the test. Corrosion test data are presented for synthetic condensate systems in which sodium hydroxide, sodium polyphosphate and neutralizing and film-forming amines are used. The effect of precorrosion of the test specimen and of contamination of the condensate with boiler water on the functioning of several types of inhibitors are described. The merits and limitation of the test method and possible interpretations of certain of the results are discussed.

Author's Abstract

Resistor Alloy

Grindrod, J. NEW SWEDISH HEATING MATERIALS FOR CERAMIC KILNS. *Ceramics* (British), 4, 423-424 (1952) November.

A new alloy used as an electrical resistance element for high-temperature furnaces is introduced by the A.B. Kanthal firm in Sweden. They claim it can withstand temperatures of 1600 to1700° F., and it is resistant to air-oxidation at these temperatures. Properties of their well known electrical resistance alloy, Kanthal, are also presented.

S. Mori

Salt Water Corrosion

Dorey, S. F. SOME OBSERVATIONS ON CORROSION IN ENGINEERING. *J. Inst. Petroleum* (British), 38, 885-918 (1952) November.

Corrosion problems are reviewed, with emphasis on corrosion of machines in marine service. Corrosion of ship hulls and propellers by sea water is also discussed.

W. G .Bair

Thermal Insulation

Thring, E. H. WHAT TYPE OF THERMAL INSULATION IS BEST? *Can. Chem. Proc.*, 37, 60-62 (1953) January.

The requirements which a good insulation must meet and some recent developments which have been made in an old stand-by thermal insulation—85% magnesia—are discussed. An improved magnesia known as "J-M New Process 85% Magnesia" has been developed from extensive research and experience. Details of manufacture and the advantages which appear both in manufacture and use are given.

D. J. Dennison

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Bibliography of Technical Reports
Bituminous Coal Research
Blast Furnace and Steel Plant
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British Abstracts
British Coal Utilization Research Association Monthly Bulletin and Quarterly Gazette
Butane-Propane News

California Oil World
Canadian Chemical Processing
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Industrial and Engineering Chemistry
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Instruments

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